



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,475	10/12/2006	Michiya Odawara	Q78377	6672
23373 7590 03/18/2008 SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037				
EXAMINER				
TRAN, TRANG Q				
ART UNIT		PAPER NUMBER		
2811				
MAIL DATE		DELIVERY MODE		
03/18/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/577,475

**Applicant(s)**

ODAWARA ET AL.

**Examiner**

TRAN Q. TRAN

**Art Unit**

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 October 2006.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.  
4a) Of the above claim(s) 8-14 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-7 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 12 October 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date 10/12/2006, 04/27/2006  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Inventor's Patent Application  
6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Election/Restrictions*

Applicant's election without traverse of Group I (claims 1-7) in the reply filed on January 24, 2008 is acknowledged.

Claims 8-14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group II, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on January 24, 2008.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-7** are rejected under 35 U.S.C. 103(a) as being obvious over Udagawa (US 2003/0178631) in view of Ota et al. (US 6,259,122).

**Re. claim 1**, Fig. 1 of Udagawa discloses a pn-heterojunction compound semiconductor light-emitting device comprising

- a crystalline substrate (101);
- a lower cladding layer (103) formed on a surface of the crystalline substrate (101) and composed of an n-type Group III-V compound semiconductor (¶ 33);

a light-emitting layer (104) formed on a surface of the lower cladding layer (103) and composed of an n-type Group III-V compound semiconductor (¶ 36);

an upper cladding layer (106) formed on a surface of the light-emitting layer (104) and composed of p-type boron phosphide (¶ 47); and

a p-type electrode (108) attached to the upper cladding layer (106), the lower and upper cladding layers being opposed to each other and sandwiching the light-emitting layer, thereby forming, together with the light-emitting layer, a light-emitting portion of a pn-heterojunction structure (as seen in Fig. 1),

wherein the light-emitting device has an intermediate layer (105) composed of an n-type boron-containing Group III-V compound (¶ 38-40) between the light-emitting layer (104) and the upper cladding layer (106).

Udagawa differs from the claimed invention in not explicitly teaching an n-type electrode attached to the lower cladding layer.

Figure of Ota teaches a LED device comprises an n-type electrode (101) that formed on the n-type cladding layer (3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide an n-type electrode attached to the lower cladding layer in Udagawa, in order to reduce contact resistance.

**Re. claim 2**, Udagawa discloses the pn-heterojunction compound semiconductor light-emitting device according to claim 1, wherein the lower cladding layer (103) is

composed of  $\text{Al}_A\text{Ga}_B\text{In}_C\text{N}$  in which  $0 \leq A, B, C \leq 1$  and  $A+B+C=1$ .

**Re. claim 3,** Udagawa discloses the pn-heterojunction compound semiconductor light-emitting device according to claim 1, wherein the light-emitting layer (104) is composed of  $\text{Ga}_x\text{In}_{1-x}\text{N}$ , (in which  $Q = 0$ ).

**Re. claim 4,** Udagawa discloses the pn-heterojunction compound semiconductor light-emitting device according to claim 1, wherein the n-type intermediate layer (105) is composed of boron phosphide (¶ 38-40).

**Re. claim 5,** Udagawa discloses the pn-heterojunction compound semiconductor light-emitting device according to claim 1, wherein the light-emitting layer (104) has an outermost layer composed of an n-type layer of  $\text{Ga}_x\text{In}_{1-x}\text{N}$  layer in which  $0 \leq X \leq 1$  (¶ 36), having a crystal face orientation of and the n-type intermediate layer (105) is composed of an n-type boron-containing Group III-V compound (¶ 38-40) having a crystal face orientation of and is formed on the outermost layer of the light-emitting layer.

**Re. claim 6,** Udagawa discloses the pn-heterojunction compound semiconductor light-emitting device according to claim 1, wherein the n-type intermediate layer (105) is composed of an undoped n-type boron-containing Group III-V compound (¶ 38-40) whose crystal face orientation of is parallel to an a-axis of an n-type  $\text{Ga}_x\text{In}_{1-x}\text{N}$  layer in

Art Unit: 2811

which  $0 \leq X \leq 1$  (¶ 36).

**Re. claim 7**, Udagawa discloses the pn-heterojunction compound semiconductor light-emitting device according to claim 1, wherein the n-type intermediate layer (105,  $1 \times 10^{17} \text{ cm}^{-3}$  to  $5 \times 10^{19} \text{ cm}^{-3}$ ) has a carrier concentration equal to or lower than that of the p-type boron phosphide layer forming the upper cladding layer (106,  $5 \times 10^{17} \text{ cm}^{-3}$  to  $5 \times 10^{19} \text{ cm}^{-3}$ ) provided on the intermediate layer (105), has a layer thickness of 2 nm to 60 nm (10-250 nm) and is composed of an undoped n-type boron-containing Group III-V compound (¶ 38-40, and 46).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TRAN Q. TRAN whose telephone number is (571)270-3259. The examiner can normally be reached on Mon - Thu (9am-5pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne A. Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

Art Unit: 2811

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/T. Q. T./

Examiner, Art Unit 2811

/Cuong Q Nguyen/

Primary Examiner, Art Unit 2811